



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/716,616	11/20/2003	Henricus A. Marquering	0142-0436P	6357
2292	7590	06/16/2008		
BIRCH STEWART KOLASCH & BIRCH			EXAMINER	
PO BOX 747			DALEY, CLIFTON G	
FALLS CHURCH, VA 22040-0747			ART UNIT	PAPER NUMBER
			2624	
			NOTIFICATION DATE	DELIVERY MODE
			06/16/2008	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/716,616	MARQUERING ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	CLIFTON G. DALEY	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on \_\_\_\_.
- 2a) This action is **FINAL**.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-24 is/are pending in the application.
  - 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_ is/are allowed.
- 6) Claim(s) 1-24 is/are rejected.
- 7) Claim(s) \_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.
 

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All    b) Some \* c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) <input type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. ____ .
3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)	5) <input type="checkbox"/> Notice of Informal Patent Application
Paper No(s)/Mail Date ____ .	6) <input type="checkbox"/> Other: ____ .

## **DETAILED ACTION**

### ***Response to Amendment***

This action is Final. Claims 1-24 are currently pending. Applicant's response received on 2/19/2008 is fully considered herein and is not persuasive.

### ***Claim Rejections - 35 USC § 102***

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 1-3, 11, 14, 15 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Belaid et al. (Hereinafter "Belaid": Y. Belaid, A. Belaid and E. Turolla, "Item Searching in Forms: Application to French Tax Form", 1995, IEEE Proceedings of the third international conference on Document analysis and recognition, Montreal, Que., Canada, pages 744-747 (August 14-16, 1995)).

**Regarding claims 1, 14 and 18,** Belaid teaches a method, equivalent computer program product embodied on at least one computer readable medium, and equivalent device, of segmenting a composite image of pixels into a number of fields corresponding to lay-out elements of the image, the pixels having a value representing the intensity and/or color of a picture element, the method comprising: constructing separating elements corresponding to rectangular areas of adjacent pixels of the image having a background property indicative of a background of the image (**page 745, Fig.**

**2, i.e. real segments of the Hough line, corresponding black lines representing background elements of the image);** and constructing a graph representing the lay-out elements of the image by defining vertices of the graph on the basis of intersections of separating elements that are substantially oriented in predetermined separation directions (**page 745, § 3, ¶ 1**), defining edges of the graph between the vertices corresponding to the separating elements (**page 745, § 3, ¶ 1, i.e. arc link**), and defining field separators corresponding to the edges of the graph (**page 744, § 2, ¶ 1, i.e. cell boundaries**).

**Summary of Applicant's Remarks:** Regarding independent claims 1, 14, 18 and their respective dependent claims, Belaid et al. does not disclose the feature of "constructing separating elements corresponding to rectangular areas of adjacent pixels of the image having a background property indicative of a background of the image". Belaid et al. operates on existing black lines, whereas the present invention operates on background areas. Black lines do not represent background elements of the image.

**Examiner's Response:** Belaid et al. teaches black areas (page 745, left column, lines 14-17, i.e. thick lines, which inherently have an area). Furthermore Belaid et al. discloses that black is a background property of the image (page 744, Section 2, paragraph 1, lines 3-5). Therefore, Belaid et al. does disclose the feature of "constructing separating elements corresponding to rectangular areas of adjacent pixels of the image having a background property indicative of a background of the image".

**Regarding claims 2 and 15**, Belaid teaches the method and equivalent computer program product as claimed in claim 1, wherein the step of defining vertices comprises: constructing subsets of the separating elements that are substantially oriented in the predetermined separation directions (**page 745, Fig. 2, i.e. horizontal and vertical**), and determining the intersections between pairs of separating elements from the subsets (**page 745, § 3, ¶ 2**).

**Regarding claim 3**, Belaid teaches the method as claimed in claim 2, wherein the step of determining the intersections comprises: determining an area of overlap of the separating elements from the subsets (**page 745, § 3, ¶ 2, lines 1-3, i.e. the intersection of the vertical and horizontal lines**), and locating the vertex at the center of the area of overlap (**i.e. the intersection of the corresponding Hough lines which are centered in their respective vertical and horizontal strips, page 745, left column, lines 18-22**).

**Regarding claim 11**, Belaid teaches the method as claimed in claim 1, wherein the step of constructing the separating elements comprises: processing the image in two orthogonal separation directions (**page 745 § 2, ¶ 2, lines 7-9, i.e. vertical and horizontal directions**).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claim 4** is rejected under 35 U.S.C. 103(a) as being unpatentable over Belaid as applied to claim 1 above, and further in view of Abdel-Mottaleb et al. (Hereinafter "Abdel-Mottaleb": US 6263113).

Belaid teaches the method as claimed in claim 1.

Belaid does not teach the limitation wherein the graph constructing step comprises: assigning a weight to the edges indicating an Euclidean distance between the vertices.

However Abdel-Mottaleb discloses a graph constructing step comprising: assigning a weight to the edges indicating an Euclidean distance between the vertices (**column 5, lines 31-33**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have applied Abdel-Mottaleb's step to Belaid's graph construction, the motivation being to detect form cells in a complex background (**Abdel-Mottaleb: column 1, lines 48-50**).

5. Claims 5, 10, 17 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Belaid as applied to claim 1 above, and further in view of Antonacopoulos et al. (Hereinafter "Antonacopoulos": A. Antonacopoulos and R. T. Ritchings, "Flexible Page Segmentation Using the Background", 1994, IEEE Proceedings of Computer Vision and Image Processing, Vol. 2, pp. 339-344).

**Regarding claims 5, 17 and 20,** Belaid teaches the method, equivalent computer program product, and equivalent device, as claimed in claim 1.

Belaid does not teach the limitation to the method as further comprising:

constructing a set of maximal rectangles, a maximal rectangle being a rectangular part of the image in one of the separation directions, that has the maximum possible area without including a pixel not having the background property indicative of a background of the image; and

constructing the separating elements in a cleaning step wherein at least one pair of overlapping maximal rectangles in the set is replaced by an informative rectangle that is a rectangular part of an area combining the areas of the pair, the rectangular part having the maximum possible length in the relevant separation direction.

However Antonacopoulos discloses an image segmentation method comprising the steps of constructing a set of maximal rectangles, a maximal rectangle being a rectangular part of the image in one of the separation directions, that has the maximum possible area without including a pixel not having the background property indicative of a background of the image (**page 341, § 2.2, ¶ 1**); and constructing the separating

elements in a cleaning step wherein at least one pair of overlapping maximal rectangles in the set is replaced by an informative rectangle that is a rectangular part of an area combining the areas of the pair, the rectangular part having the maximum possible length in the relevant separation direction (**page 341, Figure 4, white tile A**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have applied Antonacopoulos' maximal rectangle steps to Belaid's image segmentation method, the motivation being to identify white space separators (**Belaid: Page 746, § 5, ¶1, lines 9-11**).

**Regarding claim 10**, Belaid in combination with Antonacopoulos teaches the method as claimed in claim 5, wherein the step of constructing the maximal rectangles comprises: determining a list of maximal runs, a maximal run being a straight line of pixels having the background property, the line having the maximum possible length without including a pixel not having the background property, taking a specific maximal run from the list as rectangle, testing the rectangle if extension is possible by determining for a next maximal run if the next maximal run comprises pixels adjacent to pixels of the rectangle in a width direction, if the extension is possible, extending the rectangle by constructing a new rectangle having the maximum area including pixels of the rectangle and the next maximal run, if no extension is possible, adding the rectangle to the set of maximal rectangles, and eliminating from the list any maximal run that is completely contained in the new rectangle (**Antonacopoulos: page 341, § 2.2 ¶ 2-4, i.e. the Antonacopoulos algorithm is substantially the same, and**

**produces the same result as the recited algorithm. While Antonacopoulos does not explicitly disclose the use of a list in his algorithm, the use of lists to facilitate adding, sorting and removing items was well known in the art at the time of the invention and would therefore have been obvious to try).**

6. **Claim 6** is rejected under 35 U.S.C. 103(a) as being unpatentable over Belaid in combination with Antonacopoulos as applied to claim 5 above, and further in view of Katsuyama (US 6226402).

Belaid in combination with Antonacopoulos teaches the method as claimed in claim 5.

Belaid in combination with Antonacopoulos does not teach the limitation wherein the cleaning step further comprises at least one of the following: deleting a maximal rectangle having a length below a predefined value, deleting a maximal rectangle having a width below a predefined value, and deleting a maximal rectangle having an aspect ratio below a predefined value, the aspect ratio being a longer side length divided by a shorter side length.

However Katsuyama discloses a cleaning step further comprising at least one of the following: deleting a maximal rectangle having a length below a predefined value, deleting a maximal rectangle having a width below a predefined value, and deleting a maximal rectangle having an aspect ratio below a predefined value, the aspect ratio being a longer side length divided by a shorter side length (**See Fig. 16, for the**

**horizontal case, and note that the same process can be applied to the vertical case (column 16, lines 4 and 5)).**

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have applied Katsuyama's deleting method to the cleaning step of Belaid combined with Antonacopoulos, the motivation being to extract ruled line equivalent separators (**Katsuyama: column 2, lines 62-65**).

7. **Claim 7** is rejected under 35 U.S.C. 103(a) as being unpatentable over Belaid in combination with Antonacopoulos as applied to claim 5 above, and further in view of McLeod et al. (Hereinafter "McLeod": US 5778092).

Belaid in combination with Antonacopoulos teaches the method as claimed in claim 5.

Belaid in combination with Antonacopoulos does not teach the limitation wherein, prior to the step of constructing the maximal rectangles, the image is preprocessed by at least one of the following: removing noise by adapting the value of isolated deviant pixels to an average value of pixels in the neighborhood, halftoning by transforming the pixels to either white or black, and reducing the number of pixels by downsampling.

However McLeod discloses a preprocessing step wherein the image is preprocessed by at least one of the following: removing noise by adapting the value of isolated deviant pixels to an average value of pixels in the neighborhood (**column 10, line 25**), halftoning by transforming the pixels to either white or black (**column 9**,

**(lines 57-60, i.e. thresholding), and reducing the number of pixels by downsampling (column 2, lines 6-11, i.e. reduced resolution).**

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have applied McLeod's preprocessing method prior to the step of constructing the maximal rectangles of Belaid combined with Antonacopoulos, the motivation being to enhance separation of text and images from page background (**McLeod: column 10, lines 43-45**).

8. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Belaid in combination with Antonacopoulos as applied to claim 5 above, and further in view of Huang et al. (Hereinafter "Huang": US 5416849).

**Regarding claim 8**, Belaid in combination with Antonacopoulos teaches the method as claimed in claim 5.

Belaid in combination with Antonacopoulos does not teach the limitation wherein, prior to the step of constructing the maximal rectangles, the image is filtered by detecting foreground separator elements that are objects in the foreground of the image having a pattern of pixel values deviating from said background property, and by replacing pixels of the detected foreground separators by pixels having the background property.

However, Huang discloses a filtering step wherein the image is filtered by detecting foreground separator elements that are objects in the foreground of the

image having a pattern of pixel values deviating from said background property (**column 14, lines 21-23, i.e. long line segments**), and by replacing pixels of the detected foreground separators by pixels having the background property (**see Figs. 2C and 2D**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have applied Huang's filtering method prior to the step of constructing the maximal rectangles of Belaid combined with Antonacopoulos, the motivation being to improve field extraction by removing extraneous lines (**Huang: column 7, lines 49-53**).

**Regarding claim 9**, Belaid in combination with Antonacopoulos and further in view of Huang, teaches the method as claimed in claim 8, wherein the foreground separator elements include black lines (**Huang: column 14, line 22**), dashed lines, or dotted lines (**Huang: column 19, BLOB, i.e. dashed and dotted lines are encompassed by the BLOB primitive**).

9. Claims 12, 13, 16 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Belaid as applied to claim 1 above, and further in view of Sakai et al. (Hereinafter "Sakai": US 5949555).

**Regarding claim 12**, Belaid teaches the method as claimed in claim 1, wherein the step of constructing the separating elements comprises: detecting graphical

elements that are objects in the foreground of the image having a pattern of pixel values deviating from said background property (**page 744 § 2, i.e. lines**).

Belaid does not teach the limitation wherein the separating elements are constructed around the graphical elements.

However, Sakai discloses a method wherein the separating elements are constructed around the graphical elements (**Figs. 30-32**).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to have applied Sakai's separation method to Belaid's application, the motivation being to improve field extraction by precise classification of field attributes (**Sakai: column 1, lines 47 and 48**).

**Regarding claims 13, 16 and 21**, Belaid teaches the method, equivalent device, and equivalent computer program product as claimed in claim 1.

Belaid does not teach the limitation wherein at least one of the fields is classified as text field, a reading order is detected in the text field, and foreground components are joined to text lines in the text field in a direction corresponding to said reading order.

However, Sakai discloses a method, equivalent computer program product, and equivalent device wherein at least one of the fields is classified as text field (**column 20, lines 17-19**), a reading order is detected in the text field (**column 20, lines 29-36, i.e. vertical or horizontal direction**), and foreground components are joined to

text lines in the text field in a direction corresponding to said reading order (**e.g. see Figs. 30A, Title Portion**).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to have applied Sakai's separation method to Belaid's application, the motivation being to improve field extraction by precise classification of field attributes (**Sakai: column 1, lines 47 and 48**).

10. **Claim 19** is rejected under 35 U.S.C. 103(a) as being unpatentable over as applied to claim 1 above, and further in view of Mahoney et al. (Hereinafter "Mahoney": US 6470095).

Belaid teaches the device as claimed in claim 18.

Belaid does not disclose the device further comprising: a display unit for displaying fields of the image after segmenting.

However Mahoney discloses a display unit for displaying fields of the image after segmenting (**Fig. 1, Display Monitor, and Fig. 21**).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized Mahoney's display device, the motivation being to provide user feedback (**Mahoney: column 4, lines 1-3**).

11. Claims 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Belaid as applied to claim 1 above, and further in view of Antonacopoulos.

**Regarding claims 22-24,** Belaid teaches the method, equivalent computer program product, and equivalent device, as claimed in claim 1.

Belaid does not teach the limitation to the method wherein the rectangular areas are white areas.

However Antonacopoulos discloses an image segmentation method using maximal rectangles wherein the rectangular areas are white (page 340, section 2, paragraph 2, i.e. white spaces of varying sizes).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have applied Antonacopoulos' maximal rectangle steps to Belaid's image segmentation method, the motivation being to identify white space separators (**Belaid: Page 746, § 5, ¶1, lines 9-11, i.e. Belaid clearly discloses the need for a method to search for white bands and Antonacopoulos discloses such a method).**

### ***Conclusion***

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CLIFTON G. DALEY whose telephone number is 571-270-3144. The examiner can normally be reached on Monday - Friday 7:30am - 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samir Ahmed can be reached on 571-272-7413. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Samir Ahmed  
Examiner  
Art Unit 2624

CGD  
6/9/2008

/Samir A. Ahmed/  
Supervisory Patent Examiner, Art Unit 2624